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RESEARCH ARTICLE

A new species of *Lelegeis* (Coleoptera: Tenebrionidae: Diaperini) from the Atlantic Forest of Brazil

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ABSTRACT. *Lelegeis* Champion, 1886 occurs only in the Neotropical region and comprises four species: *L. aeneipennis* Champion, 1886 from Mexico; *L. apicalis* Laporte & Brullé, 1831 from Cuba; *L. hispaniolae* Triplehorn, 1962 from Haiti and the Dominican Republic; and *L. nigrifrons* (Chevrolat, 1878) occurring in Brazil, Mexico, Panama, Peru and Venezuela. Here, *Lelegeis pytanga* **sp. nov.** is described based on specimens collected in the Atlantic Forest of Brazil, and the first detailed description of the sclerites of the male and female terminalia of *Lelegeis* is produced. The new species can be easily distinguished from the other *Lelegeis* by its dull reddish brown to reddish orange elytral coloration, while the remaining body surface is dull black. The morphology of *Lelegeis* and its generic boundaries within Diaperinae are discussed.

KEY WORDS. Darkling beetle, Diaperinae, host fungi, Southeast Brazil.

INTRODUCTION

Lelegeis Champion, 1886 was proposed by Champion (1886) for a single species, *L. aeneipennis* Champion, 1886, described from a single specimen from Cordoba, Mexico. Later, *Platydema apicalis* Laporte & Brullé, 1831, known only from Cuba, was transferred to *Lelegeis*, and *L. hispaniolae* Triplehorn 1962 was described from Haiti (type locality Ennery) and the Dominican Republic. *Platydema nigrifrons* Chevrolat, 1878, a very common beetle from Brazil (type locality Ega, nowadays Tefé, in the state of Pará), Mexico, Panama, Peru and Venezuela, was also transferred to *Lelegeis* (Triplehorn 2009). No subsequent work mentioned the genus.

The main and probably only feature that allows the separation of *Lelegeis* from the morphologically similar genus *Platydema* Laporte & Brullé, 1831 is the abnormally large and flattened basal protarsomere of the males (Triplehorn 1962). The current delimitation of *Platydema* is problematic, as the delimitation of other Diaperini genera such as *Cosmonota* Blanchard, 1846, which does not have any precise feature to distinguish it from *Platydema*; and *Liodema* Horn, 1870, with its peculiar anterior prolongation of the mesoventrite (Triplehorn 1962). Here, we describe *Lelegeis pytanga* sp. nov. from the Atlantic Forest of Brazil, and discuss the morphology of *Lelegeis* and the generic limits within Diaperini.

MATERIAL AND METHODS

About two thirds of the individuals of *Lelegeis pytanga* sp. nov. were collected between 2014 and 2017 at "Mata da Biologia", "Mata do Paraíso" and "Parque Nacional do Caparaó", which are remnants of the Atlantic Forest biome in Southeast Brazil. Additional individuals found in the collection of Instituto Oswaldo Cruz were collected in the Atlantic Forest of the state of Rio de Janeiro. Host fungi of the individuals collected by us were identified to species whenever possible.

Examination and dissection of adults were conducted under a Zeiss Stemi 2000-C stereomicroscope. Sclerites of the female terminalia, including the spermatheca, were stained with a solution of 0.5% Chlorazol Black E in 85% alcohol to enhance contrast. Whole mount preparations of dissected sclerites were made using a water-soluble mounting media based on polyvinyl alcohol and lactic acid. Slides were photographed under a Zeiss AxioLab compound microscope equipped with a Zeiss AxioCam

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MRc. Adults were photographed under a Zeiss Discovery V20 stereomicroscope with a Zeiss AxioCam 506, and final images were the result of montaging 25 to 40 image slices at different focal lengths using the extended focus module of Zeiss ZEN 2012 software.

The description of *L. pytanga* sp. nov. was based mostly on the male holotype, except for the description of the female terminalia, which was based on a paratype. The terms for the external morphology, including sclerites of the abdominal terminalia, follow Matthews et al. (2010). The term "compound sensoria" as used here refers to the aggregation of sensilla, forming distinct multi-pronged structures (Medvedev 1977, Matthews et al. 2010). The following acronyms of measurements (in mm) and ratios are used throughout the text: EL, elytral length (at midline, from base of scutellar shield to elytral apex); EW, greatest elytral width; GD, greatest depth of the body (from elytra to metaventrite); PL, pronotal length along midline; PW, greatest pronotal width; TL, total length (= EL+PL; head not included). The ratio GD/EW was recorded as an indication of the degree of convexity; TL/EW indicates the degree of body elongation.

The labels were printed in white paper, unless otherwise specified. Label data are cited verbatim in quotation marks; a column separates each line of a label and a backslash separates different labels of a specimen. Square brackets are used to denote our comments on label data. The number, gender and depository of specimens bearing these labels are stated immediately before the label data.

Acronyms of depositories. (AMBC) Ayr Bello private collection, Rio de Janeiro, RJ, Brazil (Ayr de Moura Bello); (CEIOC) Coleção Entomológica do Instituto Oswaldo Cruz, FIOCRUZ, Rio de Janeiro, RJ, Brazil (Jane Costa); (CELC) Coleção Entomológica do Laboratório de Sistemática e Biologia de Coleoptera, Viçosa, MG, Brazil (Cristiano Lopes-Andrade); (CEMT) Seção de Entomologia da Coleção Zoológica, Departamento de Biologia e Zoologia, Universidade Federal do Mato Grosso, Cuiabá, MT, Brazil (Fernando Z. Vaz-de-Mello); (CERPE) Coleção Entomológica da Universidade Federal Rural de Pernambuco, Recife, PE, Brazil (Paschoal C. Grossi)

TAXONOMY

Lelegeis pytanga sp. nov.

http://zoobank.org/74420FC0-7AA0-478A-B1D3-BDCE5866DF59

Figs 1–10

Type locality. Estação de Pesquisa, Treinamento e Educação Ambiental Mata do Paraíso (EPTEA Mata do Paraíso), Viçosa, state of Minas Gerais, Brazil, 20°48'08"S, 42°51'30"W.

Diagnosis. *Lelegeis pytanga* sp. nov. can be easily distinguished from the other species of the genus by its dull reddish brown to reddish orange elytral coloration, while the remaining body surface is dull black. *Lelegeis nigrifons* is light colored with dark spots, *L. hispaniolae* is entirely shiny dark reddish brown, *L. apicalis* is shiny dark brown and *L. aeneipennis* is shiny testaceous.

Description. Male, holotype (Figs 1–2, 5, 7–8). **Body** moderately convex, dull, glabrous; length 6.48 mm, width 4.00 mm; pronotum, head, scutellar shield, antennae and legs black, elytra reddish brown. **Head** finely punctate, rounded anteriorly; clypeus transverse, clearly defined, its punctation denser than that of the remaining head dorsum; epicanthus expanded and covering antennal insertions dorsally. **Eyes** with anterior portion emarginated by epicanthus, forming a lower lobe about 2.5 times as large as upper lobe. **Antennae** 11-segmented; antennomere 2 shorter than the remaining, about half the length of the antennomere 3; antennomeres 4–11 gradually expanded into a long, loose club, compound sensoria small, each with about the diameter of an ommatidium, distributed all over the surface of all the club antennomeres. **Pronotum** strongly transverse, trapezoidal, about 2.5 times as wide as long, widest at base; lateral edges explanate, visible for their entire lengths from above; anterior edge truncate and posterior edge sinuate; punctation not discernible. **Elytra** approximately 3.5 times as long as pronotum, widest at middle; epipleuron reaching elytral apex; punctation striate, with 8 striae on each elytron. **Hind wings** developed, apparently functional. **Ventral surface** shiny, with small golden setae; prosternal process rhombus-shaped, expanding to middle and then narrowing to apex. **Protibiae** with inner edge serrate; apex bearing a row of small spines; inner apical angle with two long, thick spines. **Tarsomeres** bearing two rows of small setae ventrally. **Protarsi** with the first protarsomere expanded (Fig. 5), about twice as wide as the others and about as long as the following three; basal protarsomeres with a ventral plaque instead of rows of setae. **Abdominal process** sharply acute. **Metaventrite** with a small median groove in the point of contact with the abdominal process (Fig. 2, arrow). **Aedeagus** (Fig. 7) dorso-ventrally flat; basale about 2.5 times as long as apicale; apicale widest at base, strongly narrowed from middle to apex, apex sharply acute; basale widest at basal 1/3, slightly curved ventrally; penis narrow, about as long as basale, membranous, except for the lateral edges. **Spiculum gastrale** (Fig. 8) Y-shaped, with posterior branches expanded. **Female paratypes** (Figs 3–4, 6, 9–10) similar to males except for the following features: **Protarsi** without modified basal tarsomere (Fig. 6). **Female abdominal terminalia** (Fig. 9) with bursa copulatrix about three times as long as gonocoxites together; bursa without window or other visible sclerites; common oviduct about as long as bursa; spermatheca(Fig. 10) about as long as the apical gonocoxite, devoid of check valve, with basal and apical cylindrical sclerotized invaginations, the basal invagination reaching about the middle of spermatheca, the apical invagination reaching about the apical 1/3 of the spermatheca and forming a dome-like structure apically; each side of ovipositor transversely divided into four gonocoxites; gonocoxites varying in length, with the basal gonocoxites small, bearing oblique baculi; second and third gonocoxites similar in length, about

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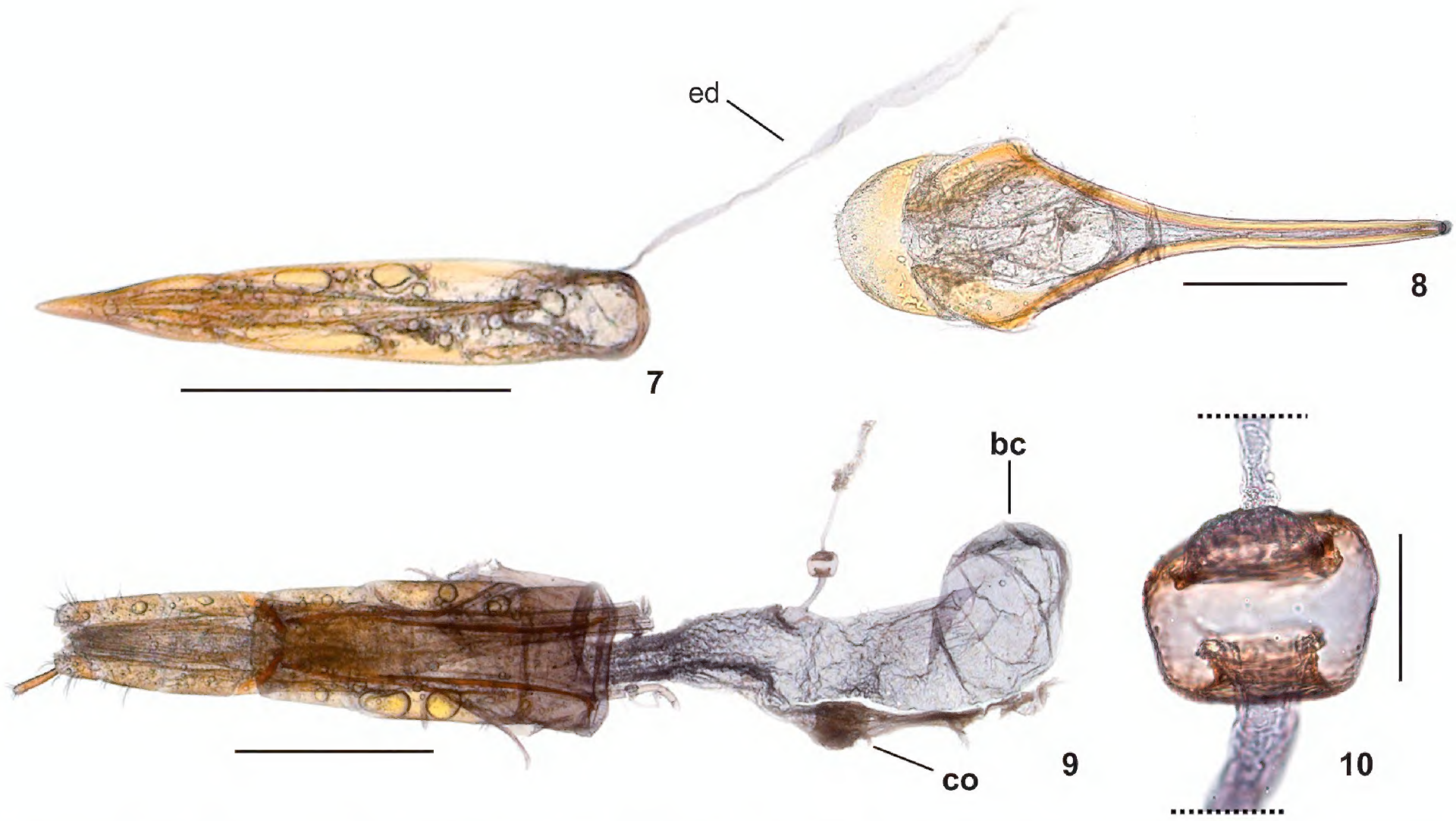
Figures 1–6. *Lelegeis pytanga* sp. nov.: male holotype, habitus dorsal (1) and ventral (2) views. Female paratype, habitus dorsal (3) and ventral (4) views. Protarsomeres male (5) and female (6). Scale bars: 1–4 = 1 mm, 5–6 = 0.5 mm.

twice as long as the basal ones; each apical gonocoxite small, about as long as the basal, bearing long setae and one long gonostylus; gonostyli inserted almost laterally, about as long as apical gonocoxites, slightly expanding to apex, apex bearing five long setae; paraprocts about as long as gonocoxites together, bearing long parallel baculi. Proctiger long, slender, medially membranous, bearing baculi laterally.

Measurements. Male holotype (in mm). TL = 6.48, PL = 1.36, PW = 3.44, EL = 5.20, EW = 4.00, GD = 2.64; ratios: GD/EW = 0.66, TL/EW = 1.62. Male paratypes (in mm; n = 7). TL = 6.32–8.00 (7.19 ± 0.58), PL = 1.28–1.76 (1.52 ± 0.18), PW = 3.28–4.16 (3.73 ± 0.33), EL = 5.04–6.40 (5.67 ± 0.44), EW = 4.00–5.04 (4.54 ± 0.32), GD = 2.56–3.12 (2.85 ± 0.17); ratios: GD/EW = 0.59–0.68 (0.63 ± 0.03), TL/EW = 1.54–1.62 (1.58 ±



Figures 7–10. *Lelegeis pytanga* sp. nov.: (7) ventral view of aedeagus; (8) spiculum gastrale; (9) female terminalia; (10) spermatheca. (bc) Bursa copulatrix, (co) common oviduct, (ed) ejaculatory duct. Scale bars: 7–9 = 1 mm, 8 = 0.5 mm, 10 = 0.1 mm.

0.02). Female paratypes (in mm; n = 11). TL = 6.56–7.60 (7.27 ± 0.43), PL = 1.28–1.76 (1.60 ± 0.15), PW = 3.36–4.00 (3.76 ± 0.26), EL = 4.96–6.00 (5.66 ± 0.34), EW = 4.08–5.20 (4.67 ± 0.41), GD = 2.72–3.12 (2.93 ± 0.12); ratios: GD/EW = 0.55–0.73 (0.63 ± 0.06), TL/EW = 1.46–1.63 (1.56 ± 0.06).

Variation. Elytra varying in color from reddish brown to reddish orange.

Material examined. Holotype, male (CELC), labeled "BRASIL: MG, Viçosa; Mata do Paraíso; 11.x.2016; C. Lopes-Andrade & I. Souza-Gonçalves\ex *Hydnopolyporus fimbriatus*\HOLOTYPE *Lelegeis pytanga* Aloquio & Lopes-Andrade [red label]". Paratypes as follow: 1 female (CELC) labeled "BRASIL: MG, Viçosa; Mata do Paraíso; 11.x.2016; C. Lopes-Andrade & I. Souza-Gonçalves\ex *Hydnopolyporus fimbriatus*"; 1 male (CELC) labeled "BRASIL: MG, Viçosa; Mata do Paraíso; 17.v.2014; leg. C. Lopes-Andrade et al.\ex *Favolus tenuiculus*"; 1 male and 2 females (CELC) labeled "BRASIL: MG, Viçosa; Mata da Biologia, 18.ii.2015; leg. S. Aloquio, A. Orsetti & M. Bento; ex *Favolus tenuiculus*"; 1 male (CELC) labeled "BRASIL: MG, Viçosa; Mata do Paraíso; 03.ii.2014; LabCol leg."; 1 female (CELC) labeled "BRASIL: MG, Viçosa; Mata da Biologia; 26.x.2016; Orsetti & Pecci-Maddalena leg.\ex *Lentinus brumalis*"; 1 male (CELC) labeled "BRASIL: MG, Alto Caparaó; PARNA do Caparaó; Vale Verde 1200m; 06.xii.2016; Aloquio & Orsetti leg.\ex *Favolus tenuiculus*"; 3 females (1 AMBC, 1 CEMT and 1 CERPE) labeled "BRASIL: MG, Viçosa; EPTEA Mata do Paraíso; 14–15.xii.2016; 'trilha do pesquisador, perto das jabuticabeiras'; I. Pecci-Maddalena & C. Lopes-Andrade leg.\ex *Favolus tenuiculus*"; 1 female (CELC) labeled "BRASIL: MG, Viçosa; Mata da Biologia; 26.i.2017; Aloquio & Gomes leg.\ex *Favolus tenuiculus*"; 1 male (CEIOC) labeled "USINA TIJUCA; RIO DE JANEIRO; P BOHRNHEIM; 2/X/1963 [handwritten]\COLEÇÃO FIOCRUZ"; 3 males and 3 females (CEIOC) labeled "Itatiaia; RJ – BRASIL; III-1933 [handwritten]; J. F. Zikán\Coleção J F. Zikan". All paratypes are additionally labeled "PARATYPE *Lelegeis pytanga* Aloquio & Lopes-Andrade [yellow label]"

Host fungi. Specimens from Viçosa were collected once in *Hydnopolyporus fimbriatus* (Cooke) Reid (Meripilaceae) and *Lentinus brumalis* (Pers.) Zmitr. (Polyporaceae), and four times in *Favolus tenuiculus* P. Beauv. Larvae were not found and the number of individuals in each basidiome was low, thus these cannot be considered breeding records.

Etymology. The species name "*pytanga*" comes from the Tupi-Guarani, the most widely distributed indigenous language in Brazil, and means "red" or "reddish", in reference to the elytral color. The term "*pytanga*" is not Latinized and its ending is unchanged, so it does not agree in gender with the genus name.

Remarks. Triplehorn (1962) pointed out that another diagnostic feature for *Lelegeis* would be the mesotibiae of males

being slender and straight for about half their lengths, then strongly curved and broadly expanded apically, being unmodified in females. However, we did not observe a significant difference between the mesotibiae of males and females, either in *L. pytanga* sp. nov. or *L. nigrifons*. Therefore, we did not add this character to the diagnosis of *Lelegeis*. The posterior median groove of the metaventrite, in contact with the abdominal process, is potentially a good feature for defining *Lelegeis*. However, its presence needs to be confirmed in species of *Lelegeis* that we have not examined (*L. aeneipennis*, *L. apicalis* and *L. hispaniolae*), and its absence in *Platydema* species needs to be confirmed. More accurate delimitations for Diaperinae genera may only be possible after a broad comparative morphological study of the character sets within the subfamily, especially characters that have been either completely neglected or insufficiently explored until now. A structure that can be easily examined, requiring only a small background in dissecting beetles, is the female abdominal terminalia. Our preliminary results show great differences in the morphology of the ovipositor, bursa copulatrix and spermatheca, all of which can be explored for taxonomic purposes. Differences in the sclerites of the female terminalia would be very helpful to separate females of *Lelegeis* from females of *Platydema*, which are almost identical in other characters.

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